

# ONCHIDIIDÆ FROM AUSTRALIA AND THE SOUTH-WESTERN PACIFIC ISLANDS

BY

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(Plate xxxviii.)

## I.—INTRODUCTION.

From the following historical review of the family, it will be seen that, since the discovery of *Onchidium typhoe* by Buchanan in 1800, the biological affinities of the Onchidiidæ have received the attention of many of the eminent authorities of Malacology.

While much remains to be done to bring the knowledge of this group into line with that we have of other groups, this paper may serve as a convenient summary for the use of Australian students, and since it has had for its foundation the excellent works of Semper, Plate, Joyeux-Laffnie and many others, no apology need be offered for the more or less extensive quotations from these authors.

The bulk of the material examined is preserved in alcohol in the collections of the Australian Museum. The absence of marine aquaria has made the much needed observations on the life and habits of even the commonest forms almost impossible.

*Onchidium dümelii* is fairly common on the shores of Port Jackson, living either below water, or under rocks between tide marks. *O. chameleon* was not plentiful when search was made for it in its habitat on the Lane Cove River in March, June and October, 1918. Both these forms exhibited the chameleon-like property of changing their colours, especially when disturbed, or changed to a position of which the background was a different colour to that formerly occupied. From this habit *O. chameleon* received its appropriate name from its author, but this property is not remarked on by other authorities of the group. It may yet be shown that the function of the dorsal eyes may be attributed to this property, rather than their value to the animal in discerning attacks from such enemies as *Periophthalmus*, as was suggested by Semper. This fish, it may be mentioned, is not an inhabitant of Port Jackson. Further, my observations have not shown that either *O. dümelii* or *O. chameleon* possess the homing habit that is attributed to *Onchidium* by recent authors<sup>1</sup>. The distribution of the family is usually tropical and continental, but one form, *Onchidella patelloides*, Quoy and Gaimard, ranges to the cold waters of South New Zealand, and an un-named species has been mentioned by Woodward<sup>2</sup> from the Ellice Islands in the Central Pacific.

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<sup>1</sup> Arey and Crozier—Proc. Nat. Acad. Sci. Wash., iv., 11, 1918, p. 319.

<sup>2</sup> Woodward—Proc. Malac. Soc., iv., 1900, p. 102.

## II.—HISTORICAL.

In 1800 Buchanan<sup>3</sup> described and figured the first recorded species of *Ouchidium*, which he called *Ouchidium typha*, an animal living on the leaves of *Typha elephantina* in the fresh or brackish water swamps of Bengal.

Cuvier<sup>4</sup> in 1804 described his *Ouchidium peronii*, an essentially marine form found on the rocks of the sea shore by Peron at Mauritius. Blainville<sup>5</sup>, who was confused by the apparent biological differences between the terrestrial species of Buchanan and the marine species of Cuvier, sought to place *Ouchidium peronii* among the Cyclobranchs. Lamarck<sup>6</sup> has accepted Cuvier's taxonomy, while Férussac<sup>7</sup> and Rang<sup>8</sup> followed that of Blainville. Férussac proposed a division of the group, allotting the marine species to his new genus *Ouchis*, leaving the terrestrial or fresh water forms to be accommodated by *Ouchidium*, of which the type was essentially terrestrial.

Blainville, however, removed Férussac's name, and replaced it by that of *Peronia*, and at the same time re-named Cuvier's species *Peronia mauritiana*: thus again establishing two groups, leaving, as Férussac had, the terrestrial species to *Ouchidium*, but allotting the marine species to his new genus *Peronia*. Delle Chiaje<sup>9</sup> in 1825 followed Blainville and allotted his Mediterranean species *Parthenopeia* to *Peronia*.

In 1830 Cuvier<sup>10</sup> essayed to establish a systematic position for the group of Onchides as they were then known, and placed them at the head of the Aquatic Pulmonates. It must be noted, that while Cuvier was guided by his masterly knowledge of anatomy, and that the position of the external openings were found by him to agree with Buchanan's species, he has left to posterity an anatomical figure reversely drawn in part, as was noted by Stoliczka<sup>11</sup>. This has no doubt been responsible for some confusion of genera and species.

The voyage of the "Coquille" brought to notice a supposed new example of Onchidiidae recorded by Lesson<sup>12</sup> in 1828 under the name of *Buchanania onchidoides*, a very large sub-marine species from Conception Bay, Chili. Lesson, however, while offering a figure and description of his species, is not credited with regard since his specimen was not preserved and has not again been seen.

<sup>3</sup> Buchanan—Trans. Linn. Soc., v., 1800, p. 132, pl. v., figs. 1-3.

<sup>4</sup> Cuvier—Ann. du Musée, v., 1804, p. 37.

<sup>5</sup> Blainville—Journal de Physique, Dec., 1817; Dict. Sci. Nat., xxiii., 1818, p. 504.

<sup>6</sup> Lamarck—Hist. Anim. sans Verts., 1st ed., vi., 2, 1822, p. 46.

<sup>7</sup> Férussac—Tabl. Syst., pl. xxxi., 1821.

<sup>8</sup> Rang—Manual l'Hist. Nat. Mollusques, 1829, p. 152.

<sup>9</sup> Delle Chiaje—Descrizione e notomia degli animalia senza vertebre della Sicilia, ii., 1825, p. 13, pl. xlvi.

<sup>10</sup> Cuvier—Le Regne Animal, ed. 1830, t. iii., p. 46.

<sup>11</sup> Stoliczka—Journ. Asiat. Soc. Bengal, xxxviii., pt. 2, No. 2, 1869, p. 99.

<sup>12</sup> Lesson—Voy. de la "Coquille", Zool., 1828, p. 296; figure in Adams—Gen. Rec. Moll., iii., 1858, pl. lxxxi., fig. 4, 4a, p. 235.

In 1831 Ehrenberg<sup>13</sup> contributed observations on the probable means of respiration, which later was to become a question of considerable argument; and in 1832 Audouin and Milne Edwards<sup>14</sup> recorded some habits and observations on *Onchidium cellicum*, noticed by Cuvier, but not described by him. In this year too Deshayes<sup>15</sup> records his opinion that the species already described could not be safely given a systematic position until further research had been conducted.

In his "Figures of Molluscous Animals," by Mrs. Gray, Gray<sup>16</sup> has given his consideration to the family and tabulates a list of four genera and eighteen species; and he introduces the new genus *Onchidella*, to which he allots ten species hitherto known as *Onchidium*, though the specification of this genus is confined to a single phrase "back without radiating processes".

The year 1852 brings an addition of five new species as described by Conthouy and Gould<sup>17</sup>.

Forbes and Hanley<sup>18</sup> in 1853 record interesting observations for the time on *Onchidium cellicum*, and perhaps correctly desire to credit the authority of the species to Couch and not to Cuvier; to these observations are appended some anatomical notes communicated to the authors by Hancock.

Milne Edwards<sup>19</sup>, who had in 1832 given his opinions on the habits and organisation of *Onchidium cellicum* with Audouin, withdraws these opinions in his "Leçons sur la Physiologie et l'Anatomie de l'Homme et des Animaux" and agrees with the previously recorded opinions of Ehrenberg.

Keferstein<sup>20</sup> in 1865 published some valuable notes on the genitalia of the Onchidiidæ, and while these observations are held by Joyeux-Laffaie to be of little importance, and probably incorrect, it is worthy of notice that Keferstein's observations would cause the Onchidiidæ, to be considered among the Opisthobranchiata.

In 1869 Stoliczka<sup>21</sup> re-established the faulty description of the genotype *Onchidium typhæ*, and in addition to describing some new species he gives some observations on their habits.

In 1871 Vaillant<sup>22</sup> published his anatomical research on *Onchidium cellicum* and Taslé<sup>23</sup> and Recluz<sup>24</sup> also made additions to the knowledge of

<sup>13</sup> Ehrenberg—Symbolæ Physicæ seu Icones et descriptiones animalium evertoratorum, decas prima, 1831.

<sup>14</sup> Audouin and Milne Edwards—Récherches pour servir à l'histoire naturelle du littoral de la France, i., 1832, p. 118.

<sup>15</sup> Deshayes—Hist. nat. des vers., ii., 1832, p. 663.

<sup>16</sup> Gray—Vol. iv., 1850, p. 117.

<sup>17</sup> Conthouy and Gould—Wilkes U.S. Explor. Exped., xiii., Moll., 1852, pp. 290-293.

<sup>18</sup> Forbes and Hanley—British Mollusca, iv., 1853, p. 3, pl. FFF, fig. 6.

<sup>19</sup> Milne Edwards—Leçons sur la physiologie et l'anatomie de l'homme et des animaux, 1857-81.

<sup>20</sup> Keferstein—Zeits. wiss. Zool., xv., 1865, pp. 86-93, pl. vi., figs. 14, 15.

<sup>21</sup> Stoliczka—Journ. Asiat. Soc. Bengal, xxxviii., pt. 2, No. 2, 1869, p. 99 et seq.

<sup>22</sup> Vaillant—Compte Rendu, lxxiii., 1871, pp. 1172-1174.

<sup>23</sup> Taslé—Journ. de Conch., xix., 1871, p. 368.

<sup>24</sup> Recluz—Act. Soc. Linn. Bord., xxvii. (Mel. Malac.), 1871, pp. 59-62.

this species. *Onchidium verruculatum* is dealt with by Nevill<sup>25</sup>, while Mörch<sup>26</sup> contributes his observations on the colouration of *Peronia verruculata*, *P. mauritiana* and *P. marmorata*. Dall<sup>27</sup> described *Onchidella borealis*, Bland and Binney<sup>28</sup> *Onchidium schrammi*, and Tapperone Canefri<sup>29</sup> *Onchidella griseofusca*.

Of *Onchidella* it is interesting to note that the research on this species by Binney<sup>30</sup> showed that a definite jaw was present, while the whole family had previously been considered to be agnathous. H. von Jhering<sup>31</sup> contributed to the habits of *Peronia*, insisting on the fact that this species lived between high and low water, and defended the branchial qualities of the dorsal appendages—both much debated questions.

In 1880-2 Semper produced his monograph of the family as part of the "Reisen in Archipel Philippinen", this was the first and very successful attempt to bring the family into systematic order, and to establish the relationship of the genera and the species. In this work Semper admits two genera—*Onchidium*, and his new genus *Onchidina*, the former made up of eighteen species divided into six groups characterised by the genitalia.

Fischer and Crosse<sup>32</sup> discuss the characters of the family, admitting the genera *Onchidium* without, and *Peronia* with, ramified dorsal appendages, both occurring only on the shores of the Indo-Pacific Oceans; and also the doubtful genus *Buchanania* and the genus *Onchidiella*.

In 1882 the thesis of Joyeux-Laffnie<sup>33</sup> added to the work of Vaillant a complete knowledge of the organisation and development of *Onchidium celticum*; and while this author is sceptical of the accuracy of the work done by his predecessors, his taxonomy is at fault, and his observations would cause the systematist to remove the family from the Pulmonata to the Nudibranchiata. As a result of this paper Brock<sup>34</sup> also came to the conclusion that *Onchidium* was a Nudibranch "in process of becoming an air breather". Bergh<sup>35</sup>, however, who must be admitted to be a leading authority on the Nudibranchiata, rejects this opinion entirely; and von Jhering<sup>36</sup> is opposed to the opinions of Bergh.

Until 1894 new species were being continually described, among those of interest to Australia being *Onchidium chameleou*, described by Brazier<sup>37</sup> from the Lane Cove River (Port Jackson).

<sup>25</sup> Nevill—Proc. Asiat. Soc. Bengal, Dec. 1870.

<sup>26</sup> Mörch—Journ. de Conch., xx., 1872, p. 325; and Vid. Medd., xi., 1872, p. 28.

<sup>27</sup> Dall—Am. Journ. Conch., vii., 1872, p. 135.

<sup>28</sup> Bland and Binney—Ann. Lyc. N. York, x., 1874, pp. 339-341, pl. xvi., figs. 3-5.

<sup>29</sup> Tapperone Canefri—Malac. Viag. Magent., 1873, p. 101, pl. ii., fig. 1a.

<sup>30</sup> Binney—P. Acad. Phil., 1876, p. 184, pl. vi., figs. bb, ee.

<sup>31</sup> Jhering—Ueber die systemm. Stellung von *Peronia* und die Ordnung der Nephropneusta, 1877.

<sup>32</sup> Fischer and Crosse—Moll. Mexique, 1878, pp. 683-689, pl. xxxi., figs. 1-12.

<sup>33</sup> Joyeux-Laffnie—Organisation et développement de l'Onchidie (*Thèse pour la Faculté des Sciences de Paris*, 1822).

<sup>34</sup> Brock—Biol. Centralblatt, 1883, iii., 12, p. 370.

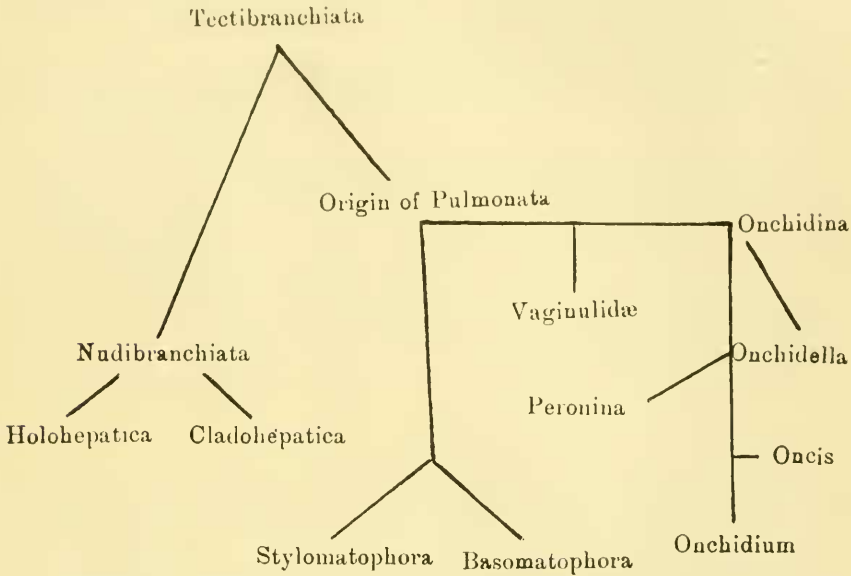
<sup>35</sup> Bergh—Morphol. Jahrbuch., Bd. x., 1884, p. 172; and An. Mag. Nat. Hist. (5), xiv., 1884, p. 259.

<sup>36</sup> Jhering—Zeits. wiss. Zool., 1879, xli., p. 259.

<sup>37</sup> Brazier—Proc. Linn. Soc. N.S. Wales, x., 1886, p. 729.



In 1893 Plate<sup>38</sup> brought the family into more permanent and stable condition, establishing the genera and species; and with this paper, so thorough in all its stages, is offered a systematic position of the genera as follows:



Of the subsequent specific and anatomical work by Haller<sup>39</sup>, Fujita<sup>40</sup>, Wissel<sup>41</sup>, Farran<sup>42</sup>, Pelseneer<sup>43</sup>, Stantschinsky<sup>44</sup>, and many others, little comment need be made, since the work of these authors makes valuable additions and no alterations to the establishment of the family as set by Plate, and closely followed by Simroth<sup>45</sup>.

### III.—THE GENERA.

The following key, based on the work of Plate, has been adapted to the classification of the Australian and South Western Pacific forms:

- A. Male genital opening toward the inside and below the right tentacle.  
 I. With appendicular gland and cartilaginous element generally present in the penis.

*Onchidium*. Hyponota narrower than the sole of the foot. Head large, and in life projecting freely beyond the mantle border. Form oval or elongate oval.

<sup>38</sup> Plate—Zool. Jahrb., Anat., vii., 1893, pp. 93-234, taf. 1-12.

<sup>39</sup> Haller—Verh. ver. Heidelb., v., 1894, p. 301.

<sup>40</sup> Fujita—Zool. Mag., vii., 1896, p. 47 (in Japanese).

<sup>41</sup> Wissel—Zool. Jahrb., Suppl., iv. (Fauna Chilensis, i.); 1898, p. 583 et seq.

<sup>42</sup> Farran—Report on the Ceylon Pearl Fisheries, iii., 1905, p. 329.

<sup>43</sup> Pelseneer—Mém. Acad. Belg., liv., 1901, fasc. 3.

<sup>44</sup> Stantschinsky—Zeits. wiss. Zool. Syst., xxvi., 1908.

<sup>45</sup> Simroth—Bronn's Klass. u. ord. des Tier. Reichs., iii., 1912, Mollusca, Lief.

Back arched. Border of the mantle not notched and without multicellular glands. Branchial plumes sometimes present; dorsal eyes present and usually arranged in groups.

*Oncis*. Hyponota as broad or broader than the sole of the foot. Head small and almost always broadly over-reached by the head shield. Form broadly oval, elongate oval, or rounded; back depressed. Mantle border not notched and without multicellular glands. Branchial plumes absent. Dorsal eyes when present not arranged in groups.

- Ia. Anterior portion of the penis armed with cartilaginous hooks; a cartilaginous tube present.....*Oncidium steenstrupii*, Semper.  
 ,, *marmoratum*, Lesson.  
 ,, *ambiguum*, Semper.  
 ,, *vaigiense*, Quoy & Gaimard.
- Ib. Anterior portion of the penis armed with cartilaginous hooks; posterior portion soft but with a cartilaginous element.....*Oncidium verruculatum*, Cuvier.  
 ,, *lucidum*, Semper.  
 ,, *melanopneumon*, Bergh.  
 ,, *peronii*, Cuvier.
- Ic. Anterior portion of the penis smooth, and without cartilaginous hooks; a cartilaginous tube present.
- II. An appendicular gland present, but cartilaginous element absent.....  
*Oncidium danielii*, Semper.  
 ,, *griseum*, Plate.
- III. An appendicular gland absent, but cartilaginous element present in the penis.  
 a. With small cartilaginous hooks only.....*Oncidium nebulosum*, Semper.  
 b. With small cartilaginous hooks and tube.....*Oncis coriacea*, Semper.  
 c. Anterior portion of the penis soft and without cartilaginous hooks; a cartilaginous tube present.....*Oncis lata*, Plate.  
 d. Without hooks and cartilaginous tube, but with a small cartilaginous support near the appendicular gland.....*Oncidium cinereum*, Quoy & Gaimard.
- IV. An appendicular gland and cartilaginous element absent.....  
*Oncidium papuanum*, Semper.  
 ,, *meriakrii*, Stant.  
 ,, *fungiforme*, Stant.  
 ,, *beulschlii*, Stant.  
*Oncis chameleon*, Brazier.
- B. The male genital opening situated to the outside of the right tentacle.  
*Peronina*.—The hyponota ascend sharply from the foot. Body form oval. Mantle border notched. Female genital opening situated  $\frac{1}{2}$  of the body length anteriorly. Male genital opening double.  
*Oncidina*.—No hyponota. Form elongate oval, back not strongly arched. Mantle borders not notched. Head medium in size. Branchial plumes and dorsal eyes absent. Tentacles incapable of retraction. Respiratory opening to the right of the anus.  
*Oncidella*.—Body form oval, back arched. Mantle border finely notched or lobed, frequently with large cellular glands discharging at the apex of the lobes. Head small. A slender longitudinal fold, or hyponotallina, runs from the tentacle to the respiratory opening close to the foot border, and on the right side rather near the foot groove; the hyponotallina thus separates the hyponota into a broad finely granulated outer zone and a smooth inner zone. The foot groove runs backwards to the anus, fusing with the muscular anal ring. Branchial plumes and dorsal eyes absent.
- I. Appendicular gland, cartilaginous hooks and tube present in the penis.  
 II. Without an appendicular gland, but with cartilaginous hooks and tube present in the penis.....*Oncidina australis*, Semper.  
 III. An appendicular gland and cartilaginous element absent.....  
*Oncidella patelloides*, Quoy & Gaimard.

For comparison, the following classification of Semper is of interest, and while not so complete, is of value; it is adapted here for the Australian and South Western Pacific forms only:

- Group I. An appendicular gland and cartilaginous tube present in the penis.....  
*Onchidium verruculatum*, Cuvier.  
 .. *peronii*, Cuvier.  
 .. *lucidum*, Semper.  
 .. *steenstrupii*, Semper.
- Group II. An appendicular gland present, but cartilaginous tube absent.....  
*Onchidium trapezoidum*, Semper.  
 .. *dümelii*, Semper.
- Group III. An appendicular gland absent, but cartilaginous tube present.....  
*Onchidium coriaceum*, Semper.
- Group IV. An appendicular gland and cartilaginous element absent. ....  
*Onchidium papuanum*, Semper.
- Group V. Without an appendicular gland and cartilaginous element; mantle border with distinct notches and papillæ, the latter bearing glandular openings..  
*Onchidium reticulatum*, Semper (= *patelloides*, Quoy & Gaimard).
- Group VI. An appendicular gland absent, but a cartilaginous support is present.....  
*Onchidium cinereum*, Quoy & Gaimard.

#### IV.—THE SPECIES.

##### ONCHIDIUM VERRUCULATUM, Cuvier.

*Onchidium verruculatum*, Cuvier, Le Regne Animal, 2nd ed., iii., 1830, p. 46 (f.n.): and in Savigny, Descrip. de l'Egypt, Moll., 1809<sup>46</sup>, p. 18, pl. ii., fig. 3. *Id.*, Semper, Reis. in Arch. Phil., iii. (Landmoll., heft v., 1880, p. 255, taf. xxi., fig. 1, taf. xxii., figs. 3-4. *Id.*, Nevill, Proc. Asiat. Soc. Bengal., Dec. 1870 (*vide* Zool. Rec., 1870). *Id.*, Farran, Rep. Ceylon Pearl Fish., iii., 1905, p. 358, pl. vi., figs. 13-22. *Id.*, Fujita, Zool. Mag., vii., 1896, p. 47 (in Japanese). *Id.*, Bergh, Challenger Rep., Zool., x., pt. 1, 1884, p. 148, pl. vii., figs. 7-12, pl. viii., fig. 14. *Id.*, v. Martens in Weber, Zool. Ergebnisse, iv., 1897, p. 126. *Id.*, Jhering, Vergl. Anat. Nervensyst. Moll., 1877, p. 230, taf. iv., fig. 16.

*Onchidium verruculatum* (Cuv.), Plate, Zool. Jahrb., Anat., vii., 1893, p. 168.  
*Peronia verruculata* (Cuv.), Schmeltz, Cat. Mus. Godeffroy, v., 1874, p. 96, No. 1574. *Id.*, Keferstein, Zeits. wiss. Zool., xv., 1864, p. 91. *Id.*, Fischer and Crosse, Moll. Mexique, 1878, pl. xxxi., figs. 13-15. *Id.*, Möreh, Vid. Med., xi., 1872, p. 28; and in Journ. de Conch., xx., 1872, p. 335.

*External Characters.*—Body form oval, back not strongly arched. Head large, tentacles long and cylindrical. Mantle border smooth; anterior portion of the foot often projecting beyond it. Hyponota smaller than the greatest width of the foot sole.

<sup>46</sup> In the second edition of "Le Regne Animal", Cuvier thus withdraws his determination of the species submitted to him, and subsequently figured as *O. peronii* by Savigny; and while the name of *O. verruculatum* must remain for *O. peronii pars*, as was followed by Keferstein *l.c.* and others, the figure and description of *O. peronii* in Savigny's work therefore represents the type of *O. verruculatum*, Cuvier.

Average size: Length 3.1 cm. breadth, 3 cm., height 2 cm. Greatest width of the foot sole 1.5 cm.

*Mantle sculpture.*—The mantle is liberally covered with simple and compound tubercles. Simple tubercles are more numerous than the compound ones and vary in size to about 1.2 mm. in diameter. Compound tubercles are represented by rosettes of from five to seven simple tubercles. Short and bunched branchial papillæ cover an area of the posterior field of the mantle. A few tubercles bear from two to five dorsal eyes; the number and arrangement of these seems to be very variable and is fully discussed by Semper *l.c.*

*Colour.*—The ground colour above is olive; flecks of brown form a variable pattern in different specimens, while the underside is regularly a lighter olive than the upper side. The top of the head is as dark as the ground colour of the mantle.

*Position of openings.*—The anal papilla is partly protected by the tail of the foot; the respiratory opening in the median line is closer to the anal papilla than to the mantle border. Male and female genital openings typical of the genus.

*Anatomy.*—Described and figured by Cuvier and Bergh; partly described and figured by Plate, Farran, Keferstein and others.

*Group character.*—Anterior portion of the penis with cartilaginous hooks; posterior portion smooth and without cartilaginous element.

*Localities.*—Brisbane (Semper, Godeffroy Museum); Samoa (Semper, Godeffroy Museum); Cape York and Port Mackay, Queensland (Semper, Kieler Museum); Port Curtis, Queensland (Kesteven Australian Museum); Broken Bay, New South Wales (Austrian Museum).

#### ONCHIDIUM NEBULOSUM, Semper.

*Onchidium nebulosum*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 257, taf. xxi., figs. 2-4.

*Onchidium nebulosum* (Semper), Plate, Zool. Jahrb., Anat., vii., 1893, p. 171.

*External characters.*—Body oval, back strongly arched. Head small, tentacles long. Hyponota sloping and raised, and smaller than the greatest width of the foot sole; the latter flat and much broader at the anterior than the posterior end.

Average size: Length 42 mm., breadth 28 mm., height 16 mm. Greatest width of the foot sole 16 mm.

*Mantle sculpture.*—The mantle is regularly and thickly covered with small papillæ; at the posterior end the papillæ are more densely arranged and appear to be grouped. Seven to nine eyes are present on many papillæ.

*Colour.*—The upper surface is regularly brownish in colour, with an irregular pattern of lighter and darker flecks; the underside is a dirty yellow, the upper side of the head being a bluish black.

*Position of openings.*—The anus is situated on a small papilla, and is entirely covered by the tail of the foot; the respiratory opening is in the median line close to the mantle border. Male genital opening situated to the right and inside the right tentacle and close to its base. Female genital opening typical of the genus.

*Anatomy.*—Partly described by Semper and Plate.

*Group character.*—Anterior portion of the penis with hooks, posterior portion soft and without cartilaginous element.

*Locality.*—Ponape, South-western Pacific (Plate).

#### ONCHIDIUM GRISEUM, Plate.

*Onchidium griseum*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 179.

*External characters.*—Body elongate oval, equally rounded anteriorly and posteriorly; back rounded but not strongly arched. Head large, tentacles long. Hyponota sloping, and smaller than the greatest width of the foot sole.

Average size: Length 27.5 mm., breadth 20 mm., height 16 mm. Greatest width of the foot sole 17 mm.

*Mantle sculpture.*—The mantle is thickly covered with granules and papillæ. The papillæ are regularly one mm. in height, with flattened tops; and around these from five to eight granules are arranged. The granules vary in size, but they are always smaller than the papillæ. Some papillæ carry from one to three eyes and these are lighter in colour than the ground colour of the mantle.

*Colour.*—The ground colour of the mantle is regularly a greyish white, while the points of the papillæ, as mentioned above, are conspicuously lighter in colour. The foot and undersurface are light and rather yellowish in colour.

*Position of openings.*—The anal papilla is not protected by the tail of the foot; the respiratory opening in the median line is close to the mantle border. Male and female genital openings typical of the genus.

*Anatomy.*—Described by Plate.

*Group character.*—An appendicular gland present, but cartilaginous element absent from the penis.

*Locality.*—Polynesia (Plate).

#### ONCHIDIUM PERONII, Cuvier.

*Onchidium peronii*, Cuvier, An. Mus. Nat. Hist. Paris, v., 1804, p. 38, pl. vi., figs. 1-9. *Id.*, Le Règne Animal, 3rd ed., 1836-49, p. 69 (f.n.). *Id.*, Mém. à l'Hist. à l'Anat. Moll., xiii., 1817, p. 1, pl. i., figs. 1-9. *Id.*, Férussac, Tabl. Syst. Moll., 1821, pt. 2, p. 6. *Id.*, Lamarck, Hist. nat. An. sans Vert., 1st ed., vi., 1822 (2), p. 46. *Id.*, Deshayes, 2nd ed., vii., 1836, p. 709. *Id.*, Krauss, Südafr. Moll., 1848, p. 72. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, pp. 258 and 260. *Id.*, Connolly, Ann. S.Afr. Mus., xi., 3, 1912, p. 224. *Id.*, Gray, Fig. Moll. Anim., iv., 1850, p. 117. *Id.*, Quoy and Gaimard, Voy. "Uranie" et "Physicienne", Zool., 1824, p. 428.



- Oncidium tonganum*, Quoy and Gaimard, Voy. Astrolabe, Zool., ii., 1832, p. 210, pl. xv., figs. 17-18. *Id.*, Semper, Reis. im. Arch. Phil., iii., landmoll., v., 1880, p. 258, taf. xix., figs. 2, 9, taf. xxii., figs. 1, 2, 10. *Id.*, Deshayes, Hist. nat. Anim. sans Vert., vi. (2), 1836, p. 709. *Id.*, Cunningham, Encycl. Britannica, 11th ed., 1910, xi., p. 252, fig. 62. *Id.*, Beugh, Challenger Rep., Zool., x., pt. 1, 1884, p. 142, pl. vi., fig. 19, pl. viii., figs. 1-2.
- Oncidium peroni* (Cuvier), Plate, Zool. Jahrb., Anat., vii., 1893, p. 172.
- Peronia mauritiana*, Blainville, Man. de Malac., 1825, p. 489, pl. xlvi., fig. 7, 1827. *Id.*, Dict. Sci. Nat., xxxviii., 1825, p. 523, pl. lxxiii., fig. 7, 1816-30.
- ? *Peronia corpulenta*, Gould, Moll. Wilkes U.S. Expl. Exp., xii., 1852, p. 293.
- Peronia tongensis* (Quoy and Gaimard), Gray, Fig. Moll. Anim., iv., 1850, p. 117.
- Peronia longana* (Quoy and Gaimard), Tapparone Canefri, Faun. Mal. N. Guinea, 1883, p. 214. *Id.*, H. and A. Adams, Gen. Rec. Moll., ii., 1858, p. 235, pl. lxxxi., fig. 3.

*External characters.*—Body elongate oval, not strongly arched. Mantle border smooth in smaller specimens, and somewhat notched in larger ones. Head large, and projecting freely as much as six to eight mm. beyond the mantle border. Tentacles short and conical, and capable of retraction into a more broadly conical base; eyes at the tips surrounded by a darker ring. Hyponota equal to the greatest width of the foot sole.

Average size: Largest specimen examined, length 104 mm., breadth 68 mm., height 20 mm., greatest width of the foot sole 29 mm.; smallest specimen examined, length 50 mm., breadth 35 mm., height 20 mm., greatest width of the foot sole 10 mm.

*Mantle sculpture.*—The mantle is liberally covered with large and small papillæ, and with coarse and fine granules irregularly arranged. In some areas the papillæ are more or less grouped; the papillæ when grouped and in the middle field, stand as much as 3 mm. from the back, while the isolated and other papillæ average 1 mm. in height. The groups of papillæ are of definite formation, and comprise (1) groups having a central papilla around which are arranged four to six papillæ of the same size; (2) groups where the central papilla is actually made up of four small papillæ, around which are five to seven bunches of three papillæ in each bunch; (3) groups of three to four papillæ appearing as small tufts. The majority of the papillæ bear dorsal eyes, either singly or in irregularly arranged groups; they are more numerous in the middle and posterior field, but are present even around the mantle margin. In large specimens branchial plumes are well developed, close to the posterior mantle border.

*Colour.*—The ground colour above is olive, with an irregular pattern of lighter and darker patches. The papillæ and granules conform to the change of colour, and in many cases they may be half the ground colour and half the pattern colour. The foot and the underside are regularly yellowish; the upper side of the head being rather more olive in colour.

*Position of openings.*—The male genital opening is situated in a transverse slit varying to 1.5 mm. in length. The anus is situated on an anal papilla emanating from the foot groove; the tail of the foot is deeply

notched, and in this notch the papilla stands unprotected. The papilla is conical in shape, and varies to 4 mm. in height. The respiratory opening in the median line is 8 mm. behind the anal papilla, and has the form of a perpendicular slit with rounded, but not prominent lips.

The female genital opening is situated on a small papilla lying at the head of the genital groove; in this species the groove is very conspicuous, and may be easily followed as far as the frontal shield, where it turns inwards to the pore of the foot gland situated behind the mouth.

*Anatomy.*—Described and figured by Bergh; histology of the dorsal tubercles described by Semper and Plate.

*Group character.*—Anterior portion of the penis armed with cartilaginous hooks; posterior portion soft, but with a cartilaginous element.

*Localities.*—Samoa, South-western Pacific (Semper, Godeffroy Museum); Port Dorey, New Guinea (Quoy and Gaimard); Santa Cruz, South-western Pacific (Australian Museum, Coll. Jennings); Buccaneer Group, Western Australia (Australian Museum, Coll. Basedow).

*ONCHIDIUM MERIAKRII, Stantschinsky.*

*Onchidium meriakrii*, Stantschinsky, Zool. Jahrb., Syst., xxv., 1907, p. 355, taf. xii., figs. 1-3.

*External characters.*—Form oval, back strongly arched. Head small, tentacles long, and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: length 33 mm., breadth 19 mm., height 17 mm.; greatest width of the foot sole, 13.5 mm.

*Mantle sculpture.*—The mantle appears quite smooth to the naked eye, but is densely covered with very small tubercles visible only with the aid of a lens. Rather larger retracted eye papillæ are irregularly placed over the mantle surface, a more conspicuous papilla occupying the centre of the middle field. Each papilla bears from three to four eyes.

*Colour.*—The ground colour of the mantle is olive, the middle field being somewhat lighter; and this lighter area is bordered by two darker lines. The edges of the mantle are darker in colour than the ground colour, though the darker colour merges into the lighter, so that the darker area could not be recognised as a border. The underside is regularly a light brown colour, with darker pigment spots placed irregularly over the hyponota.

*Position of openings.*—The anus is situated on an anal papilla, and is not protected by the tail of the foot; the respiratory opening in the median line is close to the mantle border. Male genital opening is typical of the genus; female genital opening situated 1.5 mm. to the right of the anal papilla.

*Anatomy.*—Described and figured by Stantschinsky.

*Group character.*—Appendicular gland and cartilaginous element absent

*Locality.*—Queensland (type locality, Stantschinsky).

ONCHIDIUM AMBIGUUM, *Semper.*

*Onchidium ambiguum*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 264, taf. xx., fig. 5., taf. xxi., figs. 22, 24.

? *Onchidium vaigiense* (Quoy and Gaimard), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1880, p. 289.

*External characters.*—Body globular, back not strongly arched. Mantle border smooth, underside flat. Tentacles short, eyes at the tip ringed with olive. Head very large and projecting beyond the mantle border. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 18-19 mm., breadth 11-12 mm., height 8 mm.; greatest width of the foot sole 5-6 mm.

*Mantle sculpture.*—The mantle is regularly covered with small granules which are somewhat massed in the middle field. The eyes appear as dark points on the eye papillae, even with the naked eye. The eyes may be single, and not more than four are present in a group.

*Colour.*—The ground colour of the mantle is yellowish with a variable and slightly darker pattern. Underside a dirty yellow.

*Position of openings.*—The anus is situated on a very small papilla, partly protected by the foot; the respiratory opening in the median line is closer to the anus than to the mantle border. Male and female openings typical of the genus.

*Anatomy.*—Described and figured in part by Semper.

*Group character.*—Cartilaginous hooks and tube present in the penis.

*Locality.*—Pelew Island, North Pacific (type locality, Semper): Duuk Island, Queensland (Australian Museum).

ONCHIDIUM VAIGIENSE, *Quoy and Gaimard.*

*Onchidium vaigiense*, Quoy and Gaimard, Voy. de l'“Uranie” et “Physicienne”, Zool., 1824, p. 429. *Id.*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 175, taf. vii., fig. 10, taf. xi., fig. 79.

*Onchidium vaigiensis* (Quoy and Gaimard), Tapparone Cauefri, Fann. Mal. N.Guinea, 1883, p. 213.

? *Onchidium ambiguum*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 289.

*External characters.*—Body broadly oval, almost rounded, back strongly arched. Head small, tentacles short and cylindrical. Hyponota flat, and smaller or equal to the greatest width of the foot sole.

Average size: Length 22 mm., breadth 19 mm., height 13.5 mm.; greatest width of the foot sole 10 mm.

*Mantle sculpture.*—A regularly fine granulation covers the whole of the mantle; the granules are of the same size, and each possesses a minute light spot marking a glandular opening. In the middle field three or four are recognisable, placed closely together.

*Colour.*—The colouring is very bright and this species in life is the most brilliantly coloured one of the family. The ground colour is light yellow, and the whole of the mantle surface is marbled with darker yellow

and brown. In juvenile specimens, broad yellow and brown bands and spots are predominant; while in adult specimens the ground colour prevails. The foot is dirty yellow in colour, while the head is bluish-black. The hyponota are olive, and the respiratory opening is ringed with yellow.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Described by Plate.

*Group character.*—Anterior portion of the penis with cartilaginous hooks; a cartilaginous tube is present.

*Locality.*—Vaigion and Rawak, New Guinea (Quoy and Gaimard); Ponape, South-western Pacific (Plate).

#### ONCHIDIUM STEENSTRUPII, Semper.

*Onchidium steenstrupii*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 265, taf. xx., fig. 5, taf. xxi., fig. 22, 24.

*Oncidiella steenstrupii* (Semper), Tapparone Canefri, Fann. Mal. N. Guinea, 1883, p. 213.

*External characters.*—Body shape globular, back not strongly arched. Mantle borders smooth. Head large; tentacles short and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 1.9 cm., breadth 1.6 cm., height 1 cm.; greatest width of the foot sole 1.5 cm.

*Mantle sculpture.*—The mantle appears to be smooth, but is finely granulated. Small groups of papillæ to the right and left of the middle field bear from five to seven eyes.

*Colour.*—The ground colour of the mantle is light brown, with an irregular pattern of darker flecks. The underside is yellowish-brown, the hyponota and upper side of the head being darker in colour.

*Position of openings.*—The anus is situated on a small papilla and is well protected by the tail of the foot; the respiratory opening in the median line is half way between the anal papilla and the mantle border. Male and female genital openings typical of the genus.

*Anatomy.*—Described by Semper.

*Group character.*—Cartilaginous hooks and tube present in the penis.

*Locality.*—Ponape, South-western Pacific (Semper, Godeffroy Museum); New Guinea (Semper, Tapparone Canefri).

#### ONCHIDIUM MELANOPNEUMON, Bergh.

*Onchidium melanopneumon*, Bergh, Challenger Rep., Zool., x., pt. 1, 1884, p. 129, pl. iv., figs. 25, 27, pl. v., figs. 1-27, pl. vi., fig. 5-18, 20, 21.

*Id.*, Joyeux-Laffnie, Arch. Zool. Expér. (2), iii., 1885, p. ix.

? *Oncidium peroui*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 172.

*External characters.*—Body rounded, back not strongly arched. Mantle borders smooth. Head large, tentacles long. Hyponota smooth and smaller than the greatest width of the foot sole.

Average size: Length 6.5 cm., breadth 4 cm., Height 2.5 cm.; greatest width of the foot sole 3 cm.

*Mantle sculpture.*—The mantle is regularly covered with large single granules, and the areas between these by smaller and more closely packed granules. The granules appear greyish in colour compared to the ground colour of the mantle. Minute eyes are present in groups of three to four around a central eye papilla.

*Colour.*—The ground colour of the mantle is bluish-black, the underside is regularly yellowish.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Described and figured by Bergh.

*Group character.*—The anterior portion of the penis armed with small cartilaginous hooks; posterior portion smooth, a cartilaginous rod is absent.

*Locality.*—Fiji, South-western Pacific (Bergh); Lord Howe Island, South-western Pacific (Australian Museum).

#### ONCHIDIUM BEUTSCHLI, *Stantschinsky.*

*Onchidium beutschli*, Stantschinsky, Zool. Jahrb. Syst., xxv., 1907, p. 383, taf. xii., figs. 10-12. *Id.*, Simroth, in Bronn's Tier-Reich., Moll., iii., 1910, Lief. 109-112, p. 244.

*External characters.*—Body oval in shape, and rather low and flattened. Hyponota sloping toward the sole of the foot, and smaller than its greatest width. Head small, tentacles long and conical. Mantle borders smooth and inclined to be directed upward.

Average size: Length 26 mm., breadth 27 mm., height 14 mm.; greatest width of the foot sole 13.2 mm.

*Mantle sculpture.*—The mantle is entirely covered with very small granules. Small and fine papillæ are irregularly placed over the middle field, but at the mantle borders are more closely and compactly arranged. The largest papillæ possess retractile points, bearing from three to four eyes, and are surrounded by smaller papillæ, all of which are darker than the ground colour.

*Colour.*—The ground colour is olive; the granules and papillæ are a darker shade, and where they stand compactly massed their darker colouring forming an irregular pattern. Thus the middle field appears much lighter than the outer field. The underside is regularly olive.

*Position of openings.*—The anus is situated on an anal papilla partly protected by the tail of the foot. The respiratory opening in the median line is closer to the anal papilla than to the mantle border by one-fifth of the distance.

*Anatomy.*—Described and figured by Stantschinsky.

*Group character.*—Appendicular gland and cartilaginous element absent.

*Locality.*—Queensland (type locality, Stantschinsky).

#### ONCHIDIUM TUMIDUM, *Semper.*

*Onchidium tumidum*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 262, taf. xx., figs. 3-4, taf. xxiii., fig. 4. *Id.*, Martyn in Weber, Ergebnisse, iv., 1897, p. 126.



*Oncidium tumidum*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 173.

? *Oncidium punctatum* (Quoy and Gaimard), Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 289. *Id.*, Smith, Voy. "Alert", Zool., 1884, p. 92.

*Peronia*, sp., Schmeltz, Cat. Mus. Godeffroy, v., 1874, No. 1574a, p. 96.

? *Peronia punctata* (Quoy and Gaimard), Tapparone Canefri, Fann. Mal. N. Guinea, 1883, p. 214.

*External characters.*—Body egg-shaped, back strongly arched. Mantle border smooth. Head small; tentacles long. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 35 mm., breadth 22 mm., height 15-20 mm.; greatest width of the foot sole 17 mm.

*Mantle sculpture.*—The mantle is densely covered with large and small granules. Irregularly arranged are a great number of pointed papillae, and between these stand the somewhat flattened eye bearing papillae, which are most numerous in the middle field. The eyes are in groups varying from two to fourteen.

*Colour.*—The ground colour of the mantle is olive, verging to a lighter yellowish colour near the mantle border. The underside is regularly grey.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Partly described and figured by Semper and Plate.

*Group character.*—Anterior portion of the penis with small cartilaginous hooks; posterior portion soft, and without cartilaginous element.

*Locality.*—Port Mackay, Queensland (Semper); Nudgee and Brisbane, Queensland (Australian Museum); Ponape, South-western Pacific (Plate).

#### ONCHIDIUM PAPAANUM, Semper.

*Oncidium papuanum*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 276, taf. xxi., fig. 17, taf. xxii., fig. 9.

*Peronia papuana* (Semper), Tapparone Canefri, Fann. Mal. N. Guinea, 1883, p. 215.

*External characters.*—Body oval in shape, back strongly arched. Mantle borders smooth. Head large; tentacles short. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 13-15 mm., breadth 9 mm., height 6-7 mm.; greatest width of the foot sole 6.5 mm.

*Mantle sculpture.*—The mantle is regularly covered with small granules, with larger granules irregularly situated over the surface; between the granules stand small conical tubercles bearing eyes in groups of three to four.

*Colour.*—The ground colour of the mantle is dark grey; a radiating pattern of olive to light brown varies in strength of colour in different specimens. The underside is regularly olive.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Described and figured by Semper.

*Group character.*—Penis gland and cartilaginous element absent from the penis.

*Locality.*—New Guinea (Semper, Vienna Museum); (Tapparone Canefri).

*ONCHIDIUM DÄMELII, Semper.*

*Onchidium dämeli*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 270, taf. xx., fig. 2, taf. xxi., fig. 9. *Id.*, Lendenfeld, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 731. *Id.*, Lendenfeld, Quart. Journ. Micro. Sci. (2), vi., 1886, p. 775. *Id.*, Tenison Woods, Journ. Roy. Soc. N.S.Wales, xxii., pt. ii., 1888, p. 170, pl. vii., fig. 9-14. *Id.*, Tapparone Canefri, Faun. Mal. N.Guinea, 1883, p. 213.

*External characters.*—Body oval, back strongly arched. Head large and often projecting beyond the mantle border. Tentacles short and conical. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 20 mm., breadth 15 mm., height 7 mm.; greatest width of the foot sole 11 mm.

*Mantle sculpture.*—The mantle is finely granulated between small scattered papillæ. The middle field appears smooth compared to the outer field, where the papillæ are more numerous. Many of the papillæ bear eyes in varying numbers, and these may be so prominent that they cause the mantle to appear spotted. In a number of specimens large multicellular glands are present; their presence is probably contingent on the stage of growth, or they may be seasonal.

*Colour.*—The colour above is olive or green, and an irregular darker patterning may be present. The undersides of the mantle are dark blue, while the foot and head are yellowish in colour.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Described and figured by Semper. Histology of the dorsal tubercles and eyes by Lendenfeld and Tenison Woods.

*Group character.*—An appendicular gland is present, but cartilaginous element is absent from the penis.

*Locality.*—Sydney, New South Wales (Semper, from Dämel, Godeffroy Museum); Port Jackson, New South Wales (Australian Museum); ? New Guinea (Tapparone Canefri).

*ONCHIDIUM FUNGIFORME, Stautschinsky.*

*Onchidium fungiforme*, Stautschinsky, Zool. Jahrb., Syst., xxv., 1907, p. 374, taf. xii., figs. 4-6.

*External characters.*—The body is egg shaped, back not strongly arched. The greatest breadth is across the anterior part. The hyponota are sloping, and are much smaller than the greatest width of the foot sole. Head small and retracted; tentacles thin and short.

Average size: Length 24.3 mm., breadth 18.2 mm., height 13 mm.; greatest width of the foot sole 10 mm.

*Mantle sculpture.*—The mantle is more or less thickly beset with granules and papillæ. In the middle field they are sparsely arranged, but in the outer field they are dense; the papillæ of the middle field are smaller and more retracted than those in the outer field, which are larger and stand erectly. The papillæ may bear from three to four eyes. The areas between the papillæ are finely granulated.

*Colour.*—The ground colour of the mantle is olive; a darker patch occupies the middle field, and the papillæ are of a darker hue than the ground colour, and some of them have a distinct ring of darker colouring near the apex. The ground colour is more distinctly seen on the anterior part of the body, while the outer field becomes rather darker in colour because of the arrangement of the papillæ in this area. The underside is light brown, only the head and prominent lips being darker.

*Position of openings.*—The anus is situated on a small papilla and is not protected by the foot sole; the respiratory opening in the median line is about 1 mm. from the anal papilla. Male and female openings typical of the genus.

*Anatomy.*—Described and figured by Stantschinsky.

*Group character.*—Appendicular gland and cartilaginous element absent from the penis.

*Locality.*—Queensland (type locality, Stantschinsky).

#### ONCHIDIUM CINEREUM, Quoy and Gaimard.

*Onchidium cinereum*, Quoy and Gaimard, Voy. "Astrolabe", Zool., ii., 1832, p. 661, pl. xv., fig. 29. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 280, taf. xx., fig. 11, taf. xxiii., fig. 13. *Id.*, Deshayes, Anim. sans Vert., 2nd ed., vii., 1836, p. 710.

*Onchidella cinerea* (Quoy and Gaimard), Gray, Fig. Moll. An., iv., 1850, p. 117. *Id.*, H. and A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

*External characters.*—Body rounded and depressed. Head large, tentacles small and conical. Mantle borders smooth. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 13 mm., breadth 9.5 mm., height 7 mm.; greatest width of the foot sole 6 mm.

*Mantle sculpture.*—The mantle is liberally covered with papillæ, a number of which is set in depressions which cause them to assume a lateral direction. Three to four eyes are borne on most of the papillæ. The area between the papillæ is finely granulated.

*Colour.*—The ground colour is a light brown, while a few flecks of darker colouring may form an irregular pattern in some examples. The underside is regularly a dirty yellow colour.

*Position of openings.*—Typical of the genus.

*Anatomy.*—Described and figured by Semper.

*Group character.*—Cartilaginous hooks and tube absent, but a cartilaginous support is present with the appendicular gland.

*Locality.*—Tonga Tabu, South-western Pacific (Quoy and Gaimard; Semper, Godeffroy Museum).

ONCIS CINEREA, *Odhner*.

*Oncis cinerea*, Odhner, Kungl. Sv. Vet. Akademiens Handlingar, lii., 16, 1917, p. 73, pl. iii., figs. 75, 76.

“Body depressed, rounded ovate with the notaeum densely papillose with rather regularly scattered small and large papillæ. Eyes only about 15, wide apart from each other, occupying chiefly the median part of the notaeum. Hyponotum smooth, its breadth about 1 of the foot sole. Anus free, immediately behind the foot end. Respiratory orifice in the median line, at of the breadth of the hyponotum from the anal pore. Colour greyish, with a blackish dorsal stripe and an ovate blackish girdle round the median part of the back; toward the margin black dots.

Dimensions: length 9, breadth 8.5, height 3 mm. Locality Broome (Western Australia) in the mangrove mud (18/6/1911). 1 sp.

Though this specimen might only be a young individual, it cannot be referred to any of the 9 known species constituting the genus *Oncis* (cf. Stantschinsky 1907). With respect to its shape, it shows close relation to *O. martensi*, Plate, which has, however, a uniform lemon colour. According to Stantschinsky (1907), *Oncidium* and *Oncis* are ‘richtiger als durch Übergangsmerkmale zusammenhangende Subgenera anzusehen’.”

ONCIS CHAMELLEON, *Brazier*.

(Plate xxxviii., figs. 1-4.)

*Oncidium chameleon*, Brazier, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 729.

*Id.*, Tenison Woods, Journ. Roy. Soc. N.S.Wales, xxii., 2, 1888, p. 170-171. *Id.*, Lendenfeld, Proc. Linn. Soc. N.S.Wales, x., 1886, p. 730.

*Oncis chameleon* (Brazier), Hedley, Journ. Roy. Soc. N.S.Wales, li. (Suppl.), 1918, p. M95.

*External characters*.—Body elongate oval, back not strongly arched. Mantle borders smooth. Hyponota smaller than the greatest width of the foot sole. Head small, tentacles short and conical and ringed; eyes at the tips black.

Average size: Length 38 mm., breadth 22 mm., height 17 mm.; greatest width of the foot sole 15 mm.

*Mantle sculpture*.—The mantle is regularly and finely granulated over the whole surface. No dorsal eyes are present, and branchial plumes are absent.

*Colour*.—The ground colour above is olive; two yellow and prominent lines four mm. apart at the insides, originate two mm. from the anterior edge of the mantle, and run backwards to join in a V, five mm. from the posterior edge of the mantle. Yellow patches of variable shapes form an irregular patterning. The foot and the head are yellowish in colour, and the underside of the mantle is bluish-black.

*Position of openings*.—Typical of the genus.

*Group character*.—Appendicular gland and cartilaginous element absent from the penis.

*Obs.*—No examples of this species were in the collections of the Australian Museum, and only a few were collected by the author, Mr. John Brazier, who at later dates could not find further examples. From his statements it would seem probable that the types and co-types were dissected by von Lendenfeld, as a result of which his paper was written. I collected two specimens in June 1918, one of which becomes the meta-type in the collections of the Australian Museum.

*Anatomy.*—Opened from the dorsal surface the viscera is seen (Pl. xxxviii., fig. 1) compactly massed in a well defined mantle cavity; the anatomy does not possess any extra-ordinary features compared with the described anatomy of other species of this genus.

*Alimentary system.*—The mouth is two mm. in length formed by rounded lips. The bulbus pharyngæus is strong and large, flattened on the lower side and otherwise rounded. The radula is deep brown in colour, and the dental formula differs with its shape; a complete anterior row having 96 : 1 : 96 while the central and posterior rows have 136 : 1 : 136

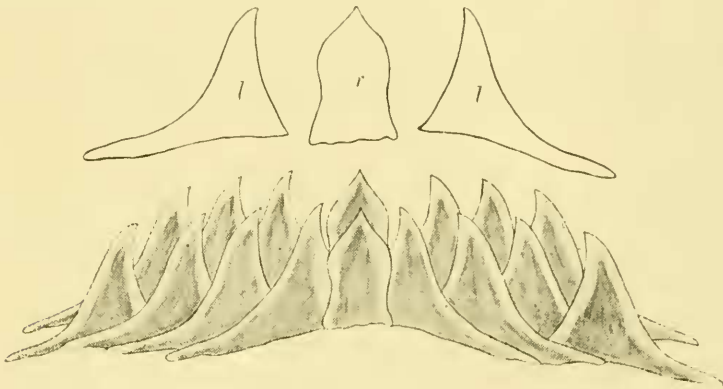


Fig. 1.

(Fig. 1). There is no definite jaw but strong dagger shaped palatal plates are present. The oesophagus leads from the bulbus pharyngæus to turn slightly to the left, between the large and yellowish salivary glands. The first stomach is small, and its internal walls have deep furrows in which are situated minute papillæ of irregular arrangement; the opening of the hepatic duct is small and does not seem to be muscularly controlled. The second stomach is considerably larger than the first, and the furrows of the first stomach continue to line the walls of the second. A short neck connects the second stomach to the third stomach; this latter is large and pear shaped, with lamellated walls, and leads by the narrower posterior end to the intestine, at two mm. from the commencement of which is a widened ampulla, which Cuvier considered to be an especial stomach.

The liver is tri-lobed and dirty yellowish in colour, occupying a large part of the visceral mass. The anterior lobe is concavo-convex in shape and its surface is traversed by slight furrows; the lower lobe is the smallest of the three, and the ducts leading to the hepatic duct are, as this



latter is, strong and elastic. The posterior liver is very large with a furrowed surface. The bile duct leading to the second stomach is free for 1.5 mm. of its length.

*Vascular system.*—The heart is contained in a thin walled pericardium, the walls of which are fused with the lung posteriorly. The ventricle is 3.5 mm. in length and the atrium four mm. The aortic valves are conspicuous, and with the atrio-ventricular valves are crescentic in shape. The blood for aëration is conducted from the sinus venosus by the sinus laterales, and the sinus pediaeus medianus; and after aëration is passed to the atrium via the pulmonary veins.

*Nervous system.*—The central nervous ganglia is contained in a capsule of connective tissue, and is situated above the oesophagus; upper and lower divisions are discernible connected by commissures. The upper or cerebral ganglion gives off the nervus tentacularis to the tentacle, and from this the thin nervus opticus originates. A delicate set is separable into nervi velares, nervi orales, nervi labiales and a distinct nervus bulbus pharyngeus, while a nervus genitalis externus turns sharply downwards to the penis. From the lower ganglion a delicate network includes the origin of the pleural ganglia and the stronger pedal ganglia from which the pedal branches arise. The buccal ganglion is triangular in shape and is much longer than the neighbouring ganglia, with which it is connected by commissures; two branches arise to innervate the oesophagus and the salivary glands.

*Respiratory system.*—The lung is large and soft grey in colour, the outer walls fusing with the inner side of the mantle, and the anterior walls with the pericardium. The inner walls are very spongy in texture, and are covered with a thin tissue which is continued into the respiratory tube opening on the lower inner side.

*Excretory system.*—Associated with the lung is a small yellowish kidney, with a very narrow urinary chamber. The organ of Bojanns does not seem to be present. The intestinal system is detailed under the Alimentary system.

*Reproductive system.*—On lifting the visceral mass, the genital mass is seen to occupy about a quarter of the anterior area of the body; the whole is covered and connected by membrane, which is easily removed with a needle point. The yellowish seminal bladder protrudes well into the mantle cavity, and the hermaphrodite duct is conspicuous by its size, yellowish colour and deep convolutions. It is somewhat spherical in shape and the main ducts—the female leading to the albuminiferous gland and the male to the vas deferens—are thick and strong. The vas deferens accompanies the vagina, to which it is connected by membrane, as far as the female genital opening, and from here it goes deeply into the body wall and becomes free again near the opening of the dart gland, continuing from here as a more thickened coil to the penis. The penis is sausage shaped and about four mm. in length; no appendicular gland or cartilaginous hooks are apparent.

*Histology.*—The histology of the dorsal tubercles of the *Onchidiida* has been admirably worked by Semper, and compared in this species by Lendenfeld and Tenison Woods.

*Locality.*—Lane Cove River (Port Jackson).

ONCIS CORIACEA, *Semper*.

*Onchidium coriaceum*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 271, taf. xix., figs. 1, 16, taf. xxi., fig. 7, taf. xxiii., fig. 12.

*Oncis coriacea* (Semper), v. Martens in Weber, Ergebnisse, iv., 1897, p. 127. *Id.*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 185.

? *Onchidium tigrinum* (Stoliczka), Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1880, p. 271.

? *Onchidium marmoratum* (Lesson), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 271.

? *Oncidium marmoratum* (Lesson), Plate, Zool. Jahrb., Anat., vii., 1893, p. 185.

*External characters*.—Body oval, somewhat depressed. Head large, tentacles very long and slightly lobed at the tips. Mantle borders smooth. Underside flat. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 47 mm., breadth 27 mm., height 15 mm.; greatest width of the foot sole 10 mm.

*Mantle sculpture*.—The mantle is finely granulated between a number of short conical papillæ, some of which bear eyes in varying numbers.

*Colour*.—The ground colour of the mantle is olive, with an irregular darker pattern; the underside is regularly yellowish.

*Position of openings*.—Typical of the genus.

*Anatomy*.—Described by Plate.

*Group character*.—Anterior portion of the penis with small cartilaginous hooks; a cartilaginous tube is present.

*Locality*.—Brisbane, Queensland (Semper, Godeffroy Museum); Finche's Bay, Cooktown, Queensland (Australian Museum).

ONCIS LATA, *Plate*.

*Oncis lata*, Plate, Zool. Jahrb., Anat., vii., 1893, p. 189, taf. vii., fig. 2. *Id.*, v. Martens in Weber, Ergebnisse, iv., 1897, p. 127.

*External characters*.—Body broadly oval, almost circular and moderately high, but not strongly arched. Head small, tentacles short and conical. Mantle borders smooth. Hyponota smaller than the greatest width of the foot sole.

Average size: Length 29 mm., breadth 27 mm., height 17 mm.; greatest width of the foot sole 8 mm.

*Mantle sculpture*.—The mantle is regularly covered with granules and papillæ. The papillæ are conical in shape, and standing one mm. in height and from four to five mm. apart give the mantle a prickly appearance. Eyes are present on all the papillæ.

*Colour*.—The ground colour of the mantle is brown; a pattern is formed by irregularly shaped and placed white flecks. The foot is dirty grey in colour, while the hyponota are olive verging to a darker area around the mantle border.

*Position of openings*.—The anal papilla is large but not high; the respiratory opening in the median line is closer to the mantle border than to the papilla. Male and female genital openings typical of the genus.

*Anatomy*.—Described and figured by Plate.

*Group character*.—Anterior portion of the penis smooth and without hooks; a cartilaginous tube is present.

*Locality*.—New Britain, South-western Pacific (Plate).

ONCHIDELLA PATELLOIDES, *Quoy and Gaimard*.

*Onchidium patelloides*, Quoy and Gaimard, Voy. "Astrolabe", Zool., ii., 1832, p. 212, pl. xv., figs. 21-23. *Id.*, Dieffenbach, Travels in N. Zealand, ii., 1843, p. 247. *Id.*, Martens, Crit. List. Moll. of N. Zealand, 1873, p. 39. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 279.

*Onchidella patelloides* (Quoy and Gaimard), Wissel, Zool. Jahrb., Syst., xx., 1904, p. 667, pl. xxv., figs. 75-77.

*Onchidella patelloides* (Quoy and Gaimard), Hutton, Man. N. Zealand Moll., 1880, p. 28. *Id.*, Suter, Man. N. Zealand Moll., 1913, p. 813, pl. xxxii., fig. 4.

*Onchidella patelloidea* (Quoy and Gaimard), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

*Onchidium reticulatum*, Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 278, taf. xx., fig. 6, taf. xxi., figs. 16, 20, 23, taf. xxiii., fig. 1.

*Onchidella reticulata* (Semper), Plate, Zool. Jahrb., Anat., vii., 1893, p. 205.

*Onchidella patelloide* (Quoy and Gaimard), Gray, Fig. Moll. An., iv., 1850, p. 117.

*External character*.—Body oval, back elevated. Mantle border more or less notched. Head small, tentacles short and conical. Hyponota wrinkled and nearly the same width as that of the foot sole. Hyponotal line distinct.

Average size: Length 26 mm., breadth 17 mm., height 8 mm., greatest width of the foot sole 12 mm.

*Mantle sculpture*.—The mantle is finely granulated between a variable number of large papillæ; marginal glands may be prominent and whitish in colour, and numbering from sixteen to twenty.

*Colour*.—The ground colour of the mantle is yellowish brown; a variable pattern is presented in different specimens, radiating black streaks being often conspicuous; but the streaks may vary in depth of colour and may be almost inconspicuous.

The front of the head is black; the rest of the underside being regularly greyish white. As mentioned above the marginal glands are whitish in colour, and in some cases are very conspicuous against the darker background.

*Position of openings*.—The anal papilla is protected by the tail of the foot sole; the respiratory opening in the median line is close to the anal papilla. Male and female genital openings typical of the genus.

*Anatomy*.—Described by Wissel, Semper, Hutton and Suter.

*Group character*.—Appendicular gland and cartilaginous element absent.

*Obs.*—An examination of a series of specimens from New Zealand, Port Jackson and Tasmania, shows a considerable variation in the colouring,

especially in the patterning, which varies from that of Quoy and Gaimard's figure to that of Semper's *O. reticulatum*. I have no doubt that *O. reticulatum*, Semper, is synonymous with this species, and from Couthouy's figure of *O. marginata* this species must be very closely related.

*Locality*.—Port Jackson, New South Wales (Hedley); Launceston, Tasmania (Simson and Bretnall, Australian Museum); Sydney (Semper, as *O. reticulatum*; Museum Godeffroy). Previously recorded from North and South Islands of New Zealand, and Chatham Island.

ONCHIDINA AUSTRALIS (Gray, m.s.), Semper.

*Onchidina australis* (Gray, m.s.), Semper, Reis. im Arch. Phil., iii., Landmoll., vi., 1882, p. 287, taf. xix., figs. 14, 15, taf. xxi., fig. 27, taf. xxiii., fig. 10.

*Onchidina australis* (Gray, Semper), Plate, Zool. Jahrb., Anat., vii., 1893, p. 208.

*Onchidella*, sp. Schmeltz, Cat. Mus. Godeffroy, v., 1874, p. 96, No. 1843.

*External characters*.—Body oval, back strongly arched. Underside flat. Head medium in size, tentacles short. Mantle borders smooth. No hyponota.

Average size: Length 30 mm., breadth 13 mm., height 10 mm.

*Mantle sculpture*.—The mantle is finely granulated between irregularly placed papillæ; the latter stand from three to four mm. apart, and appear whitish in colour against the ground colour of the mantle.

*Colour*.—Ground colour of the mantle olive, with a pattern of irregularly placed spots or flecks of a darker colour sometimes present; the papillæ as mentioned are whitish in colour, and a dark grey border runs around the body close to the mantle border. The underside of the head and foot are reddish-grey; the border of the mantle extends to the underside and has the same depth of colour.

*Position of openings*.—The anus is in the median line, while the respiratory opening is close, but to the right of it. The male genital opening is typical of the genus; the female genital opening is also typical but lying very close to the anus.

*Anatomy*.—Described by Semper and Plate.

*Group character*.—Appendicular gland absent, but cartilaginous hooks and tube are present in the penis.

*Localities*.—Brisbane, Queensland (Semper, Godeffroy Museum); Viti, South-western Pacific (Semper, Godeffroy Museum); South Seas (Semper, Kölliker); Noumea, New Caledonia (Australian Museum).

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The following species are described from the South-western Pacific. No examples are in the Australian Museum, and their anatomy has not been elaborated by their authors or by subsequent workers. From the figures and descriptions, deficient as they are in detail of a specific character, comparison will be rendered difficult without access to, or a re-description from the types.

PERONIA CORPULENTA, *Gould*.

*Peronia corpulenta*, Gould, Wilkes U.S. Expl. Exped., xii., 1852, Moll., p. 293, pl. xxii., figs. 385, 385a. *Id.*, Otia Conchologica, 1862, p. 226.  
*Oncidium perouii* (Cuvier), Plate, Zool. Jahrb., Anat., vii., 1894, p. 172.  
*Oncidella corpulenta* (Gould), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

*Description*.—"Animal elongate oval, somewhat truncated in front, deep sea green above, olivaceous beneath; foot pale; back arched, bearing numerous large, elevated, rounded tubercles, with smaller intervening ones; margins undulated; hood projecting beyond the body, broad as the body; heart lobed; lobes circular; simple and deep green above, somewhat violaceous beneath; mouth quite small, orange; tentacles linear, rather stout and long, green; foot two-thirds the length of the body. Length two inches; breadth one inch; height  $\frac{1}{2}$  inch.

A large species, somewhat irregular in outline." (*Gould*).

*Obs.*—This species has been referred to *Oncidium perouii*, Cuvier, in this paper.

*Locality*.—Direction Island, Fiji.

PERONIA ACINOSA, *Gould*.

*Peronia acinosa*, Gould, Wilkes U.S. Expl. Exped., xii., 1852, Moll., p. 291, pl. xxi., fig. 384, 384a. *Id.*, Otia Conchologica, 1862, p. 226.  
*Oncidella acinosa* (Gould), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 234.

*Description*.—"Animal elongated, everywhere closely covered with large rounded papillæ of a deep beryl green colour, shaded in the interstices with amethystine: the same colouring is found below, except the foot, which is a slaty violet, half the width of the body. Body attenuated, apparently somewhat cylindrical, equally and acutely rounded at both ends. Tentacles dark blue.

Length nearly an inch and a half; breadth three fifths of an inch.

A fine species having a mulberry like surface, and also remarkable for its unusually dark colours, the general colour being of an amethystine blue, somewhat darker than the rounded papillæ.

*Locality*.—Fiji." (*Gould*).

ONCHIDIUM FERRUGINEUM, *Lesson*.

*Oncidium ferrugineum*, Lesson, Voy. "Coquille," Zool., ii., 1830, p. 300.  
*Id.*, Gray, Moll. Anim., iv., 1850, p. 117. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1882, p. 268.  
*Peronia ferruginea* (Lesson), H. & A. Adams, Gen. Rec. Moll., ii., 1858, p. 235.

This *Oncidium* is closely related to that of M. de Blainville. It is eighteen lines in length. Its mantle is thick and fleshy, and over flowing the foot, that is to say its sides are nearly vertical. The upper part is



red, covered with papillæ, fleshy compressed and conical when viewed through the microscope. The foot is long, oval, and ending in a point, and somewhat rounded in front; it is yellowish white in colour. In juvenile specimens the part between the mantle and the foot is black. The head is large and striated. The two eye tentacles are short and situated near the mantle border. The mouth is vertical and has fleshy lips. A very conspicuous groove lies by the upper side of the lips and near the extremity of the eye tentacles; this opening leads to the oviduct. The penis is very elongated. It is cylindrical, very twisted and attached at the posterior part of the animal near the intestine, and rising upward becomes dilated near the stomach, and travels forward to the opening near the tentacle. The anus is in the form of a rounded perforation in the median line, and near the posterior border of the mantle. The lung occupies all the posterior portion of the body of the animal. They communicate with exterior by the branchial plumes; these papillæ stand above the papillæ on the posterior part of the mantle, and consists of short perforated tubes, embedded in the dermal tissue of the animal.

This *Onchidium* is essentially marine, and we found it many feet below the surface of the harbour at Dorey, New Guinea (*Lesson*).

ONCHIDIUM ATER, *Lesson*.

*Onchidium ater*, Lesson, Voy. "Coquille," Zool., ii., 1830, p. 300.

*Oncidiella atra* (Lesson), Tapparone Canefri, Faun. Mal. N.Guinea, 1883, p. 212.

*Description*.—This *Onchidium* is from twelve to fifteen lines in length, oval, very convex and somewhat reddish on its surface. Its mantle is thick and fleshy and overhangs the foot. The surface is lightly granulated with a deep black colour and some small white veins. The sides of the mantle are thick, and lighter in colour. The foot is oval, transversely striated, pointed and notched at the posterior part to receive the latter part of the intestinal tube. At the sides and on the upper part of the mantle are the branchial plumes, to communicate with the lungs. The two eye tentacles are short and placed near the anterior border of the mantle. The head is globular, having below thick lips around the mouth; this latter is rounded and small. The foot is yellow. The penis is very long, cylindrical, twisted at the posterior part and becomes a long contractile tube enveloped in a thick membrane. A tube connects with the oviduct at the opening near the right of the foot. This *Onchidium* inhabits the harbour of Dorey, New Guinea (*Lesson*).

ONCHIDIUM GRANULOSUM, *Lesson*.

*Onchidium granulatum*, Lesson, Voy. de la "Coquille", Zool., ii., 1830, p. 299, pl. xiv., fig. 2. *Id.*, Semper, Reis. im Arch. Phil., iii., Landmoll., v., 1882, p. 289.

*Onchidium granulosa* (Lesson), Gray, Fig. Moll. An., iv., 1850, p. 117.

*Oncidiella granulosa* (Lesson), Tapparone Canefri, Faun. Mal. N.Guinea, 1883, p. 212.

*Description.*—This species belongs to the section of the Onchidiidae in which the mantle is covered with prominent granules, having the appearance of little tubercles. Its form is oval and its dorsal surface convex; the length varies from fifteen to eighteen lines. The mantle is arched and covered with little warts, and the sides are longer than the foot; but the thick undersurface of the mantle is quite loose. The foot is thick and fleshy with transverse grooves, and is oval. The anus is a large perforation at the extremity of the mantle, and in the median line. The eye tentacles are short and cylindrical, and dilated at the tips to carry the ball of the eye. For description of this see the Ferruginous Onchidium (*O. ferrugineum*). This mollusc is dark green above, lighter in colour at the lower border of the mantle. The foot is yellow. We found it commonly on the beaches at Port Praslin, New Ireland, and under the same circumstances as the preceding species (*Lesson*).

ONCIDIELLA PACHYDERMA, *Plate*.

*Oncidiella pachyderma*, *Plate*, *Zool. Jahrb., Anat.*, vii., 1893, p. 204.

This species is described by *Plate* from "Victoria". The Australian State is not the locality from whence *Bucholz* collected it; and of the forty-eight localities of this name in a modern atlas, *Plate's* species is probably from a Western Equatorial African locality.

No *Onchidiidae* have yet been described from Victoria, Australia, but it is obvious that *O. patelloides* should occur there.

ONCIDIELLA TABULARIS, *Tapparone Canefri*.

*Oncidiella tabularis*, *Tapparone Canefri*, *Fann. Mal. N. Guinea*, 1883, p. 212.

? *Onchidium planatum* (*Quoy and Gaimard*), *Tapparone Canefri*, *Loc. cit.*

*Obs.*—A short note in Italian gives no specific data of this species.

*Locality.*—Wokan, Aru Island.